Malaysian Technical Universities Conference
on Engineering & Technology (MUCET) 2013

A Survey Of Supervised Machine Learning In Wireless Sensor Network: A Power Management Perspective

Riaz Ul haq 1[a], Norrozila Suliman 2[b*], Muhmmad Alam 3[b]

Faculty of System, Computer and Software Engineering,
University Malaysia Pahang, Tun Razak Highway, 26300 Kuantan, Pahang, MALAYSIA.

rias.ullah@gmail.com,{norrozila, mansoor}@ump.edu.my

Key words: Wireless Sensor Network, Supervised Machine Learning, Sink Node, Power Management, Routing ,LEACH,PEGASIS

Abstract

Wireless sensor network is a collection of a number of homogeneous and/or heterogeneous nodes in a particular area to monitor specific changes in environmental or physical occurrence. A power management in the wireless sensor network is considered as important criteria for any kind of wireless sensor network application. Multi-functional nodes are the basic unit of WSN for the current era of sensing the environmental changes, communication and computation aptitudes [Villalba et al 2009]. Wireless sensor network can be deployed in different fields of science, engineering etc. For example VANET is one of the examples of adhoc network implementation of WSN, which monitor and update traffic management system. WSN can also be used in monitoring the movement and behavior of animal migration in different seasons. WSN nodes communicate over small distance using the wireless medium with each other and with the data center to record the changes in surroundings like in agricultural environments, military based monitoring and industrial process observation [Singh et al 2011, Akyildiz et al 2002]. After the installation of wireless sensor nodes it is almost impossible to replace the power source in a device. The sensor node uses different routes to send data to sink node and to base station. The route is considered as best, where the wireless sensor network nodes use less power to transmit the data. This mechanism increases the life of the node and of the overall network. In the recent era, researchers used different routing algorithms to decrease the power consumption in order to increase the wireless sensor network life. LEACH used the randomize technique to select the cluster head according to the energy level of the node. Each node near the cluster head join the local cluster [Wendi et al 2000]. PEGASIS is greedy chain formation for data transfer. Each node sends and receives data from its nearest neighbor node. In this approach one node become the leader node which is responsible to collect data from all nodes and send the data to base station. In PEGASIS, unlike LEACH there are no clusters and multiple cluster heads, all the nodes had global information about the network nodes and sends data to only one leader node [Lindsey et al 2002]. Machine learning algorithms are considered as an efficient way for decision making in computational environments. Machine learning algorithms are iteration based algorithms, as the new knowledge is based on the previous predicted /calculated knowledge which helps to decrease errors in order to increase efficiency. This survey paper is focused on the discussion of best optimal path routing algorithms in wireless sensor networks by using supervised machine learning approaches.

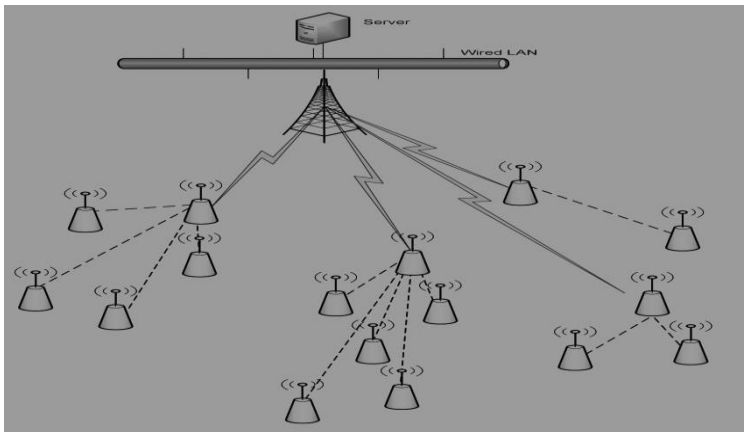

Figure 1: Energy Efficient Wireless sensor network routing flow diagram

Acknowledgement: The authors thank University Malaysia Pahang for the Graduate Research Scheme GRS 130363 .

References

Villalba, L.J.G., Orozco, A.L.S., Cabrera, A.T., Abbas, C.J.B. (2009). Routing protocols in wireless sensor networks. Sensors (Basel, Switzerland). 9, 8399–421.

Singh, S., Singh, M., Singh, D.: A survey of Energy-Efficient Hierarchical Cluster-based Routing in Wireless Sensor Networks. International Journal of Advanced …. 02, 570–580 (2010).

Akyildiz, I.F., Su, W., Sankarasubramaniam, Y., Cayirci, E. (2002). Wireless sensor networks : a survey. Computer Networks. 38, 393–422.

Ruiz-Garcia, L., Lunadei, L., Barreiro, P., Robla, J.I. (2009). A review of wireless sensor technologies and applications in agriculture and food industry: state of the art and current trends. Sensors. 9, 4728–50.

Wendi Rabiner Heinzelman, Anantha Chandrakasan, and H.B. (2000). Energy-Efficient Communication Protocol for Wireless Microsensor Networks.23rd Hawaii international conference on system science. p. 10 (2000).

Lindsey, S., Raghavendra, C.S. (2002).PEGASIS: Power-Efficient Gathering in Sensor Information Systems Stephanie Lindsey. Proceedings of IEEE Aerospace Conference. pp. 1125–1130.